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PAPERS
IN
CHEMISTRY.

The GOLD MEDAL of the Society was this Session voted to Mr. J. P. HUBBARD, Picket-street, Temple-Bar, for Specimens of British Marble, produced from the Babicomb Quarry, near Teignmouth in Devonshire. The following Communications were received from him, and Sixty beautiful Samples are fixed up in the Great Room of the Society.

SIR,

AGREEABLY to the wishes of the Society, expressed in their list of Premiums, stating that they were desirous to encourage the marble of the quarries of this country, I herewith send fifty various specimens, all arising from one quarry, named the Babicomb quarry, in my possession, situated in the parish of St. Mary Church, near Teignmouth, in the county of Devon, and adjoining the sea. I beg leave to observe, that though an attempt to introduce this article has once before failed, yet I am confident, that if I should be so fortunate as to have my exertions seconded in such a way as the nature of the concern requires, a considerable benefit

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would

would ultimately result to the country at large, as well as to myself. The numberless obstacles which I had to encounter, during a period of two years, arising from heavy expenses, and local prejudices, must have damped my exertions, if I had not resolved at the onset to give it a decided trial. Perhaps no period could have offered so eligible as this, for the advantage of the enterprize, owing to the present enormous prices of foreign marble. I am sorry to see, daily, many unaccountable prejudices arise against most articles of the produce of our own country; but I hope time will remove them. It would be presumption in me to attempt to vie with the finer articles of continental production in this line, but it cannot be denied, that the application of the marbles now produced will be useful, economical, ornamental, and worthy of encouragement. The advantages which would arise to the country at large from a general introduction of this article are very evident, and if I can be favoured with the patronage and support of the Society of Arts, &c. towards accomplishing such object, they would meet with the warmest acknowledgments of many individuals besides myself.

I have already prepared a great variety of articles, such as chimney-pieces, slabs, &c. of very large dimensions, of these marbles, which are now ready for inspection, and which will show that I have entered into this business on an extensive scale.

I subscribe myself with great respect,

Sir,

Your obedient servant,

JOHN P. HUBBARD.

12, *Picket-street, Temple-bar,*

March 1st, 1809.

TO C. TAYLOR, M.D. SEC.

The

THE specimens of marble sent by Mr. Hubbard to the Society were each of them eight inches high, six inches broad, and one inch thick, and polished on one face; such are the dimensions pointed out by the advertisement of the Society, in order that a regular range of British marbles may be fixed round the Society's Great Room, to show to the public what our quarries can produce. Mr. Hubbard's marbles were, on being received, referred to the consideration of their Committee of Chemistry, and the following additional information obtained respecting the quarry and produce thereof, viz.—

That the quarry which produced the different specimens is twelve acres in extent.

That marble similar to each specimen can be distinctly procured.

That Mr. Hubbard had then in his possession columns of red marble, eight feet long, and two feet diameter, and believed that they might be got ten feet long, and five feet diameter, and that blocks of other kinds might be got of large sizes.

That he had at that time slabs six feet six inches long, by three feet six inches in width.

That the quarry is close to the sea, and a part thereof covered by it at high water, and that he can load vessels direct from the quarry, having made a wharf for that purpose.

That the quarry is situated about four miles from Teignmouth, and was first opened about sixteen years ago, and was afterwards neglected, but that it has been now worked by him for two years.

That the marble is harder in quality as the mine goes deeper, and that some part of it rises fifty feet from the sea.

That the sale price is about half that of foreign marble of similar appearance; that the general price is now about four shillings per superficial foot, and will probably be so reduced as to be delivered at three shillings in London.

That it will take a finer polish than any other marble found in the kingdom.

That he supposes from sixty to one hundred workmen may be employed in the quarry next autumn.

That chimney-pieces made from this marble are not injured from the heat of fire applied near to them, nor liable to crack from alternate sudden changes of heat and cold.

That great part of the refuse stones of the quarry will burn to lime, and that such lime is of superior quality to any other on that coast.

The Society having taken into consideration the circumstance of Mr. Hubbard's having carried their views to so great an extent, and of his undertaking being likely to prove highly advantageous to this country, voted to him their Gold Medal, although no specific premium had been ever offered by them for coloured British Marbles.

Mr. Hubbard afterwards presented the Society with ten more specimens from his quarry, which with two specimens of Devonshire marble presented by Lord Clifford, and two others presented by Mr. W. Coles, have been framed along the surbase of the Society's Great Room; where it is also intended to place such other marbles, the produce of the British empire, as may be presented to them, with references to each sample, that the public may know from whence each kind can be procured.

The

The SILVER MEDAL of the Society was this Session voted to Mr. R. PORRETT, Jun. of the Tower, for the following Communication of Experiments and Observations made by him on the Prussic and Prussous Acids.

SIR,

I TAKE the liberty of offering to the Society of Arts, Manufactures, and Commerce, a Memoir on the Prussic Acid, detailing some experiments, by which I have attempted to prove that oxygen is one of its principles, and giving an account of a new acid which I have been fortunate enough to discover.

I have the honour to be,

Sir,

Your most obedient,

Humble servant,

R. PORRETT, JUN.

Tower, 21st April, 1809.

TO C. TAYLOR, M.D. SEC.

Memoir on the Prussic Acid.

CONSIDERABLE differences of opinion exists among the most celebrated chemists respecting the composition of

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the prussic acid, some agreeing with Fourcroy and Vauquelin that oxygen is one of its component parts, and others with Berthollet and Proust, who dispute its presence. Mr. Proust, in his history of the Prussiates, asserts, "That
" there is no fact that indicates oxygen to make a part of
" this acid, and that from the well-known affinities of its
" three elements added to the circumstances under which
" it is formed, it can scarcely be thought that it does." This difference of opinion implies a want of some decisive experiments, which may set the question for ever at rest, and those which I am going to relate I am induced to think are of that description.

Some time back, I proposed to myself the discovery of a method of preparing a triple prussiate of potash, in a pure state, which should be free from the objections to which the processes in general use are subject. In reflecting on the means most likely to attain this end, it occurred to me, that I should succeed if I decomposed prussiate of iron by double elective attraction rather than by single, employing, instead of a pure potash, that alkali, in combination with a substance uniting the properties of solubility when combined with potash, strong attraction for oxide of iron, and insolubility when united to that oxide. The only substances I could think of possessing all these requisite properties were the succinic acid and sulphur; as the high price of the former precluded its use for this purpose, I determined to employ the latter. I therefore took one ounce of dry sulphuret of potash, and one ounce and a half of the best prussian blue, previously well washed and powdered, and put them into a Florence flask, two thirds filled with distilled water; a disengagement of sulphuretted hydrogen, of ammonia, and of caloric immediately took place

place. The materials were boiled slowly together for three hours, occasionally replacing the water which evaporated. The whole was then thrown on a filter ; what remained on the filter was black, and consisted of sulphuret of iron, and undecomposed prussiate of iron. The liquid that passed through, I found on trial to consist of triple prussiate of potash, and hydroguretted sulphuret of potash. In order to complete the decomposition of the latter, I boiled the liquid again, for the same time as before, with another half ounce of prussian blue, and when cold filtered it. The filtered liquid (A) was now nearly colourless, and free from hydroguretted sulphuret. On pouring a little of it into a solution of oxy-sulphate of iron, I was very much surprised to find that solution changed to a deep blood-red colour, without any precipitate ensuing, instead of forming with it a precipitate of blue prussiate of iron. So unexpected a phenomenon determined me to undertake an examination of this liquid ; with this view I subjected it to the action of the chemical agents mentioned in the following table.

TABLE I. with Liquid A.

| CHEMICAL AGENTS. | EFFECTS. |
|-----------------------------|---|
| Paper stained with turmeric | No change of colour. |
| Paper stained with litmus. | Do. Do. |
| Potash - - - | { No disengagement of ammonia, nor any { apparent change. |
| Lime - - - | Do. Do. |
| Diluted sulphuric acid | { An expulsion of sulphurous acid, the { liquid becomes slightly opalescent. |
| Nitric acid (pure) - | { The acid assumes a red colour, but this { effect is not permanent. |
| Oxy-muriatic acid - | This acid loses its smell. |
| Muriatic acid (pure) - | No change. |
| Muriate barytes - | A white precipitate. |
| Tincture of galls - | No change. |
| Nitro-muriate platina | { A heavy brilliant ochre, yellow precipi- { tate. |
| Muriate gold - | Dark olive brown precipitate |
| Nitrate silver - | { A precipitate at first white, but quickly { passing to yellow, red, and lastly to brown. |
| Sulphate silver - | { A dull white or stone coloured precipi- { tate. |
| Oxy-nitrate mercury - | A white precipitate |
| Oxy-nitrate lead - | A white precipitate. |
| Super-sulphate copper | A dull white precipitate. |
| Muriate bismuth - | No precipitate. |
| Sulphate iron - | No change. |
| Oxy-sulphate iron - | { The solution assumes a deep blood-red { colour. No precipitate. |

The effects of the sulphuric acid and of the muriate barytes clearly proved the existence of sulphite of potash in the liquid, while that of the oxy-sulphate of iron indicated the presence of some other principle to which the liquid was indebted for its peculiar characters, the separation of this principle in a pure state became therefore a necessary preliminary operation to its examination; after a few trials I succeeded in effecting this separation. The following is the process I employed.

The liquid was evaporated by a gentle heat to dryness; upon the saline residuum alcohol was poured till it ceased to extract any thing; by this means the whole of the sulphite and sulphate of potash was left behind, and the alcohol when filtered held in solution that part only which had the red tinging property with solutions of iron. The alcohol was now got rid of by distillation, and the salt it left in the retort was redissolved in water. This solution (B) gave the following results with the different metallic solutions.

TABLE

TABLE II. with Liquid B.

| METALLIC SOLUTIONS. | EFFECTS. |
|-------------------------|--|
| Nitro muriate platina - | { A precipitate similar to that in Table I. but in a smaller quantity and longer in forming. |
| Muriate gold - - | { Light olive precipitate, some gold reduced. |
| Nitrate silver - - | { A grayish white precipitate, not changing colour. |
| Sulphate silver - - | A clear white precipitate. |
| Nitrate mercury - | A copious white precipitate. |
| Oxy nitrate mercury - | A white precipitate in small quantity. |
| Nitrate lead - - | No precipitate. |
| Oxy nitrate lead - | No precipitate. |
| Super acetate lead - - | No precipitate. |
| Hyper oxy muriate lead | A slight white precipitate. |
| Super sulphate copper | A dull white precipitate. |
| Muriate tin - - | No precipitate. |
| Muriate bismuth - | No precipitate. |
| Sulphate iron - - | No change. |
| Oxy sulphate iron - | Same as Table I. |
| Oxy sulphate manganese | { The crimson colour disappears; no precipitate. |
| Sulphate zinc - - | No change. |
| Nitro muriate cobalt - | No precipitate. |
| Nitrate nickel - - | No change. |

It is necessary to remark, that in the preceding Table, as well as in Table I. several of the nitrates and muriates were slightly reddened, though not in a degree to be compared with the oxy-sulphate of iron. I have not noticed this in the table, because I am not certain whether this effect was not owing to a minute portion of oxide of iron which might have

have been introduced into those solutions by the acids employed to make them, as both the nitric and muriatic acids of commerce generally contain some; an excess of nitric acid, even if pure, might also cause this effect, as Table I. may convince us. The solutions with which this effect occurred to me were those of bismuth, silver, mercury, lead, cobalt, gold, and platina.

The liquid B is not altered by exposure to the air.

Its effect on oxy sulphate of iron is the same, whether this sulphate is neutral, or contains an excess of acid, or is supersaturated with carbonate of ammonia.

Sulphuric acid destroys the colour produced on oxy sulphate of iron, provided the three liquids are in a concentrated state. If there is much water present, no change ensues.

Having obtained the tinging principle B, separate from the other salts with which it was contaminated, I asked myself to what was its formation and the simultaneous disappearance of the prussic acid, during the second ebullition, owing? I could imagine but five causes for this that were likely to have been efficient, concerning each of which I made a question to be resolved by experiment, viz.

Question I. Was it owing to the complete separation of the oxide of iron from the triple of prussiate by the sulphur, and the subsequent decomposition of the simple prussiate by the heat of ebullition long continued?

Question II. Was it owing to the action of the sulphurous acid produced?

Question

Question III. Was it owing to the action of the sulphuretted hydrogen?

Question IV. Was it owing to a combination of the prussiate of potash and sulphur?

Question V. Was it owing to the de-oxidation of the prussic acid, by the hydroguretted sulphuret?

To answer the first question, it is only necessary to attend to the results afforded by long-continued boiling of the simple prussiate of potash. I shall state these results as I find them recorded by Professor Proust.

They are carbonate of ammonia, carbonate of potash, and some simple prussiate that escapes decomposition, even after four or five successive distillations; there is, therefore, no analogy between the products of this experiment and the liquid A, for had the latter contained carbonate of potash, it must have changed turmeric paper brown; had it contained carbonate of ammonia, it must have done the same, and likewise have given out ammoniacal gas when potash and lime were added; it must also have turned blue the solution of copper; and had it contained prussiate of potash, it must have produced prussiate of iron when added to the green sulphate of that metal: it will be seen by referring to Table I. that none of these effects were produced. Were further evidence necessary of the dissimilarity of the two liquids, it might be mentioned that Professor Proust poured alcohol on the saline residuum of his distillation of the prussiate, which took up a part that he found to be prussiate of potash; had any of the tinging salt B been present, the alcohol must have dissolved that likewise, and it could not have escaped his observation.

observation. We have, therefore, ample grounds for negating the first question.

In order to answer the second question, I passed sulphurous acid gas for a long time through a solution of triple prussiate of potash; the prussic acid was expelled, and sulphite of potash formed; but this sulphite was not mixed with any tinging salt. On the supposition that the disappearance of the prussic acid, in the liquid A, might have been owing to its having been expelled entirely by the sulphurous acid, and that the tinging liquid resulted from the mutual action of the other principles, namely, the oxide of iron and hydroguretted sulphuret of potash: I subjected a mixture of these materials to long boiling, but could not by this means produce a liquid that tinted oxy-sulphate of iron red. Sulphurous acid gas, passed through water in which Prussian blue was diffused, did not in the least affect that compound. These experiments completely refute the opinion on which the second question was grounded.

To enable me to reply to the third question, I passed sulphuretted hydrogen gas for several hours through a solution of triple prussiate of potash, on which it was found to have no effect.

We shall be little disposed to allow that there is any foundation for the fourth question, when we consider the circumstances of the last-mentioned experiment, in which sulphur in the state of the most minute division was offered to the triple prussiate, without any combination ensuing; and also when we compare the effects of the metallic solutions in Table II. with those which would ensue with liquids containing sulphur. But, if any doubt should still be entertained on this subject, the following experiment will perhaps remove it: Into a solution of prussiate of mercury throw
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some pieces of phosphuret of lime, the oxide of mercury of this prussiate will thus be reduced and separated from the liquid which is to be filtered; some of this liquid poured into carbonate of iron turns it red, the red colour soon disappears, and a white precipitate begins to form; this white precipitate soon changes to green, and if a little nitric or oxy-muriatic acid be now poured upon it, it becomes a perfect blue prussiate of iron. This experiment, in which a liquid turning a solution of iron red was produced without the employment of a particle of sulphur, goes very far to negative our fourth question; and when considered in conjunction with the preceding ones, we can hardly do otherwise than dissent from the supposition which gave rise to that question.

But if the experiment last adduced tends to refute the fourth question, it very strongly supports the fifth; for the changes of colour observable were undoubtedly owing to successive stages of oxidation by the contact of the atmosphere. In confirmation of this question, it may likewise be asserted, that the long boiling with the hidrogenetted sulphuret is a powerful de-oxidating process. But it will be said to me, if it is really true that the prussic acid has been de-oxidated by this process, you ought to be able to recompose that acid from the solution B by oxidation. This struck me very forcibly; and being anxious to give this last proof of the truth of my deductions, I attempted the recomposition of this acid by several oxidating processes for some time without success: I had at last, however, the particular satisfaction of succeeding completely by the agency of nascent hyper-oxy-muriatic acid. The method I employed was the following:

A little hyper-oxy-muriate of potash was put into the bottom of a glass tube. Over this some of the liquid B mixed
with

with a few drops of diluted sulphuric acid was poured. The heat of a candle was then applied to the bottom of the tube, and as soon as a violent action commenced, the heat was withdrawn: by this process the prussic acid was reproduced, and was proved beyond the possibility of a doubt by the formation of blue prussiate of iron, when poured into a mixture of green and red sulphate of that metal. Blue prussiate may also be produced at once, by substituting for the diluted sulphuric acid, a solution of green sulphate of iron, with excess of acid.

Having thus succeeded in proving that the tinging principle of the liquid B was sub-oxidised prussic acid, my next object was to obtain that principle in a free state, for we must recollect that we have hitherto considered it only in combination with potash, with which it formed a neutral salt; this circumstance gave me reason for supposing it an acid, and I therefore determined to attempt its separation by abstracting its base by a stronger acid. The following was the process I employed for the purpose.

The liquid B was evaporated nearly to dryness, and put into a retort with diluted sulphuric acid, a receiver was then adapted to it, and about two-thirds of the liquid distilled over by a gentle heat; what remained in the retort was sulphate of potash. The receiver contained a colourless liquid, with a faint, sour, disagreeable smell, and a decided acid taste. This liquor I have named in conformity with the principles of the new nomenclature, *prussous acid*, and its salts *prussites*, of which the liquid B contained one in solution, namely the prussite of pot ash.

The effects of the prussous acid on the earthy and metallic solutions, as far as I have tried them, are noted in the following table.

TABLE

TABLE III. with Prussous Acid.

| CHEMICAL AGENTS. | EFFECTS. |
|-------------------------|---|
| Muriate lime - - | No change. |
| Muriate barytes - | No change. |
| Muriate gold - - | The gold precipitated metallic. |
| Sulphate silver - - | Copious white precipitates. |
| Nitrate silver - - | |
| Prussiate mercury - | No change. |
| Nitrate mercury - - | Copious grayish white precipitate. |
| Oxy nitrate mercury - | Very slight precipitate white. |
| Oxy sulphate iron - | Solution turns blood-red, no precipitate. |
| Nitro muriate platina - | No precipitate. |
| Nitrate lead - - | No change. |
| Oxy nitrate lead | Solution becomes red, but hardly any precipitate formed, unless heated, in which case a copious white precipitate ensues. The red colour disappears, a rapid action takes place between the two liquids, and some of the nitric acid of the solution is decomposed. |
| Hyper oxy muriate lead | |
| Super sulphate copper | A slight precipitate, probably of muriate of lead. |
| Muriate bismuth | |
| Nitrate nickel | Solution becomes slightly turbid. |
| Muriate tin | |
| Nitrate cobalt | No precipitates. |
| Sulphate iron - | |
| Sulphate manganese | |
| Sulphate zinc | |

I cannot conclude this part of my memoir without giving a more simple and expeditious process for preparing prussite
of

of potash, than that which I at first discovered. It is the following:

Pour a solution of prussiate of mercury into hydroguretted sulphuret of potash, till the mutual decomposition of the two liquids is completed; prussite of potash is instantly formed, and may be separated by filtration from the solid combination of the sulphur and mercury.

I wish also to observe, that the proportion of Prussian blue I have mentioned for boiling with the sulphuret is much larger than is necessary, as I have since succeeded in obtaining prussite of potash when the proportion of Prussian blue was only equal to that of the sulphuret, but long boiled with the latter in two distinct and equal portions. The prussite of potash thus obtained is, however, mixed with a much larger quantity of hydroguretted sulphuret than when a greater portion of Prussian blue is employed.

Whether the prussous acid can be applied to any use, time and future experiments must decide. It appears to me to be a very delicate test of silver and of iron in solution.

The preceding experiments, by proving the presence of oxygen in prussic acid, give it a stronger claim than it before possessed for being placed among the acids.

The prussous acid possessing stronger acid properties than the prussic is a curious, though not a solitary, instance of the effect of oxygen in diminishing acidity, when its quantity exceeds a certain fixed proportion; in this respect the prussic acid is analagous to the oxy-muriatic.

To recur to the attempt which gave rise to the researches that are the subject of this memoir, I beg leave to state, that I have succeeded in producing pure triple prussiate of potash, by stopping the process before the change which produced the prussite ensued, and by subsequent purification of the lixivium from sulphates and sulphites, by acetate of

barytes; from sulphur by acetate of lead; and, lastly, from the acetate of potash thus formed by chrystallization; but on account of the complication of this process, I hesitate to recommend it for general use.

ROBERT PORRETT, JUN.

Tower, London, April 21, 1809.

SIR,

WISHING to give every information tending to ensure success to those persons who may be inclined to repeat my experiments, I am induced to request the Society to allow the enclosed Paper to be considered as a Supplementary Note or Memorandum to the Memoir on the Prussic Acid, which I had the honour to submit to their notice.

I remain, very respectfully,

Sir,

Your most obedient humble servant,

R. PORRETT, JUN.

Tower, May 8, 1809.

TO C. TAYLOR, M. D. SEC.

It is essential to the success of the experiment, in which the prussic acid is regenerated from the liquid B by the nascent hyper-oxygenised muriatic acid, that the excess of
acid

acid remaining in the liquid, after the oxygenising process, should be neutralized by an alkali previous to pouring it into the solution of iron, which should likewise be perfectly neutral.

ROBERT PORRETT, JUN.

May 8, 1809.



Certificate in favour of Mr. Porrett's Prussic Acid.

GENTLEMEN,

I BEG to state that I have repeated the greater part of the experiments related in Mr. R. Porrett's Memoir on the Prussic Acid, and find them correct. I have no hesitation in saying the discovery of the new acid is a source of merit to himself and utility to science.

I am, Gentlemen,

Your humble servant,

JOHN DUNSTON.

Old Broad-Street, May 6, 1809.

To the MEMBERS of the Society for the
Encouragement of Arts, Manufac-
tures, and Commerce. }

The THANKS of the Society were this Session voted to Mr. WILLIAM SALISBURY, of the Botanic Gardens at Sloane Street and Brompton, for the following Communication on the Culture and superior Colouring Qualities of Madder raised by him from Seeds presented to the Society by J. Spencer Smith, L. L. D. who procured them from Smyrna. Samples of the Seed received from Mr. J. S. Smith are preserved in the Society's Repository, also the coloured Liquors referred to by Mr. Salisbury.

SIR,

I HEREWITH send you two samples of extract of Madder, one of which marked A is produced from the root of the Smyrna kind, a plant which I have not heard of being before introduced into this kingdom, the seeds of which I received from you, and which you informed me had been procured at the request of the Society of Arts, &c. from Smyrna, by J. Spencer Smith, Esq. I sowed the seeds in my Botanic Garden, at Cadogan-place, in April 1808, in a soil rather inclining to clay, and I have the satisfaction to find, from this experiment, that there is every appearance of its being cultivated with considerable success; for if I might venture to state a calculation made of the crop from the small quantity grown, the produce would be upwards of fifteen hundred weight of the fresh root per acre.

The above estimate is made on the supposition that the seeds were sown in drills at one foot distant from each other, which appears to me to be the best mode for its cultivation.

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I am thus particular, as I conceive I shall be doing my country a service, if it will induce any person to attempt the culture of this madder on a larger scale. I beg leave to observe, that the first attention which I paid to this valuable vegetable, after I had raised it from the seed, was to ascertain satisfactorily whether the superior quality of its colouring matter depended on the plant itself, or if it was merely owing to climate, or other local circumstances, which often occasion a great difference in the quality and value of many other productions of a similar nature; to prove this I had extracts made in the same manner with the prepared Dutch madder of our shops, which did not bear any comparison in point of colour with that of mine; but fearing that the Dutch madder might be damaged by the mixture of some extraneous substance, I made a similar extract from the fresh roots of the common *rubia tinctorum*, which had for some years past been growing in my garden at Brompton, and the extract marked B is the result, and is much inferior in colour to that from the Smyrna seed; though the extracts were both obtained in the same way, viz. by boiling the roots and making a precipitate from them by allum and vegetable alcali.

I flatter myself I have here been instrumental in the introduction of a plant, producing a very valuable dye, and hope we may not be long under the necessity of depending upon a foreign market. If any gentleman would wish to make experiments relative to its growth, or if any seeds of a similar nature should come into the Society's possession, I shall be happy to make experiments with them, having appropriated a piece of ground in my new botanic garden solely for such purposes. I must confess, that I have great pleasure in the above communication, as it will prove that benefits occur from botanical institutions, and that the opi-

nion formed by some persons, that the study of botany is a dry nomenclature, is founded in error, for certainly much good will arise from botanical investigations to Medicine, the Arts, and Manufactures.

I am with great respect,

Sir,

Your obedient and humble servant,

W. SALISBURY.

Brompton, April 26, 1809.

To C. TAYLOR, M. D. SEC.

DEAR SIR,

IN answer to your further enquiries respecting the madder procured from the Smyrna seed, I beg leave to observe, that with regard to the management of the seed, I found it to succeed extremely well in drills in the open ground. I also tried some in a hot-bed, which also succeeded perfectly well, but the old seed, some of which I had from you this spring, will not grow. I consider it to be a variety of the common *rubia tinctorum*, but of a more robust growth, and superior in colouring matter. These plants thrive exceedingly in my new botanic garden in Sloane-street, and I flatter myself that I have been instrumental in introducing an article which gives to cotton the most beautiful and permanent red colour in existence.

Many former attempts to cultivate madder in England have failed, I understand, on account of the calico-printers formerly requiring it in a powdery state, but since the establishment in this kingdom of the Adrianople or Turkey red dye upon cotton, some thousand tons in weight of madder roots
from

from the Levant, are annually used in Great Britain for dyeing that colour, and for which use this kind of madder in the fresh root will be found superior.

I am informed that by the application of the Society of Arts, &c. to Government, madder roots grown in England are exempted from tithes.

I have every reason to believe, that for use in painting much finer colours than the present may be obtained from the roots of this plant by spirituous or acetous extracts, but I forbear at present further experiments, in order to increase as much as possible my remaining stock of plants; and this appears necessary, as I find the seed I had left will not vegetate this spring, and I apprehend that such seed as may now remain in the Society's possession will be useless.

I shall therefore proceed to increase my present stock of the plants from offsets and cuttings of the roots. If the above account is found deserving of the Society's attention, it is much at their service, and they shall be welcome to some of the roots when I have further propagated them. They blossomed abundantly, but did not produce seed, a circumstance which I observed also in the common kind growing near it: I have therefore endeavoured to increase it by other means, which may be done to any extent, but being now particularly engaged, the means I employ must be a subject of future communication.

I am, with great respect,

Dear Sir,

Your's very truly,

WILLIAM SALISBURY.

Botanic Garden, Brompton,

Nov. 16, 1869.

TO C. TAYLOR, M. D. SEC.